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# Lesson study as a professional development framework to support an exploratory approach

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*Our aim is to present the views of a group of basic education teachers involved in a lesson study as they discuss the features of tasks, students' difficulties, and how to conduct exploratory work about rational numbers in the mathematics classroom. Data collection was made through audio/video recording of the lesson study sessions, teachers' written reflections, individual and group interviews, and a researcher's journal. The results show that the teachers developed a vocabulary to speak about mathematics tasks, and developed an appreciation for students' reasoning processes such as generalizing and justifying as well as for classroom discussions as important moments for argumentation and negotiation of meanings.*

**Key words:** Professional development, lesson study, exploratory approach.

## LESSON STUDY AND EXPLORATORY APPROACH

Lesson study is a professional development process focused on professional practice with origin in Japan, which, in recent years, has been widely used in many countries. An important feature of lesson studies is their reflexive and collaborative nature (Fernandez, Cannon, & Chokshi, 2003; Perry & Lewis, 2009). Teachers identify an important issue and work together, analysing students' difficulties, discussing curriculum alternatives, and preparing what they expect to be an "exemplary" lesson. Afterwards, they verify to what extent this lesson achieves the desired objectives and what difficulties arise. Therefore, a lesson study is a process very close to a small investigation developed by the participating teachers on their own professional practice, informed by curriculum guidelines and by research results on the given issue. Our aim is to present the views of a group of grade 5–6 teachers as they discuss the features of tasks,

students' expected difficulties and how to conduct exploratory work in the mathematics classroom. We focus especially on the professional learning of the teachers regarding the nature of the tasks, students' reasoning processes, and classroom communication.

A central aspect of lesson studies is that they focus on students' learning and not on teachers' work. Indeed, lesson studies aim to examine students' learning and to observe the way they learn. By participating in lesson studies, teachers may learn about mathematics, curriculum guidelines, students' processes and difficulties, and classroom dynamics. Lesson studies provide opportunities for teachers to reflect on the possibilities of an exploratory approach to mathematics teaching which is receiving an increasing support in curriculum orientations for mathematics education (e.g., NCTM, 2000). In this approach students are called to deal with tasks for which they do not have an immediate solution method (closed or open problems), constructing their own methods using their previous knowledge. Exploratory work creates opportunities for students to build or deepen their understanding of concepts, procedures, representations and mathematical ideas. Students are thus called to play an active role in interpreting the questions, representing of the information given and in designing and carrying out solving strategies which they must justify to their colleagues and to the teacher. However, conducting exploratory mathematics teaching is a serious challenge for teachers, demanding specific knowledge, competency and disposition.

## RESEARCH METHODOLOGY

The methodology is qualitative, using participant observation. The participants are a group of grade 5–6 teachers of a school in Lisbon involved in a lesson study focusing on rational numbers. Data collection was made through audio/video recording of the ses-

sions, teachers' written reflections, individual and group interviews, and a research journal made by a member of the research team.

Perry, R., & Lewis, C. (2009). What is successful adaptation of lesson study in the US? *Journal Educational Change*, 10, 365–391.

## **RESULTS, IMPLICATIONS AND CONTENT OF THE POSTER**

By participating in this lesson study, focusing on mathematical tasks and on students' reasoning, the teachers had many opportunities to get involved in doing mathematics through exploratory approach. They had many occasions to discuss the features of tasks that make them simple exercises or more engaging problems or explorations as well as features of reasoning processes such as justification and generalization (Lannin, Ellis, & Elliot, 2011) with rational numbers. Anticipating possible difficulties of students and looking at what they actually do in the classroom were key features of lesson study (Perry & Lewis, 2009) that were effective in leading the teachers to reflect and consider changes in their practice to conduct a more exploratory teaching in their classrooms. This led to significant learning regarding the nature of the tasks, students' reasoning processes, and classroom communication.

Using photos, schemes, and text, the poster presents the aims of the study, our framework on lesson study as a professional development setting, samples of the teachers' work on lesson study sessions, as well as implications of this kind of work for mathematics teacher professional development.

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